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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/871,492	05/31/2001	Kent D. Choquette	39943/PAN/C715	8721

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EXAMINER
WARREN, MATTHEW E

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 05/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/871,492	Applicant(s) CHOQUETTE ET AL.	
	Examiner Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6,10* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This Office Action is in response to the Amendment filed on March 3, 2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lebby et al. (US 5,956,363) in view of Brillouet et al. (US 6,052,398).

Lebby et al. discloses (col. 3, line 16 – col. 4, line 45) a method of forming a vertical cavity surface emitting laser and shows (fig. 2) a vertical cavity surface emitting laser comprising a substrate (12), a first mirror (14) adjacent the substrate, an active region (20) including one or more quantum wells (35, 36), the quantum wells formed of InGaAsN (col. 4, lines 26-28), and a second mirror (26) adjacent the active region. The laser emits light at a wavelength of 1300 nm (col. 4, lines 31-34). The substrate is made of GaAs. The VCSEL comprises one or more oxide apertures (16 and 27) near the active region. The apertures include an oxidized portion comprising aluminum oxide (col. 4, lines 1-8). The VCSEL further comprises a mesa (see width d)that extends down to the oxide aperture. The first and second mirrors are unipolar distributed Bragg reflectors that are n-type (col. 5, lines 1-3). An upper electrode (45) is formed above the second mirror stack and a lower electrode (46) is below the active region. The method

of forming the oxide apertures (col. 5, line 57 – col. 6, lines 9) includes oxidizing a portion of the oxide aperture layers and doping each aluminum alloy layer with an n or p-type dopant (col. 5, lines 1-3). Lebby shows all of the elements of the claims except the tunnel junction included in the second mirror and the method of forming it. Brillouet et al. shows (fig. 1) a surface emitting laser comprising an active region (14) sandwiched between a first mirror stack 18 and a second mirror stack (20). The second mirror stack includes a tunnel junction for injecting holes into the active region. The tunnel junction includes highly doped n-type and p-type layers (26 and 24), wherein the p-type layer of the tunnel junction is formed adjacent the active region. The laser also includes a lower electrode (22) having an annular aperture (ZC). The tunnel junction allows the pumping current to be conducted from the top mirror to the active region without a potential drop (col. 5, lines 6-13). The combination of Lebby and Brillouet inherently forms a device in which the tunnel junction is positioned at or near a standing wave null in the optical field because the combined components have the same structure and materials as the applicant's claimed invention. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the second mirror of the laser described in Lebby by adding tunnel junction layer as taught by Brillouet to allow the pumping current to be conducted to the active region without a substantial potential drop.

Response to Arguments

Applicant's arguments filed with respect to claims 1-23 have been fully considered but they are not persuasive. The applicant primarily argues that Brillouet et al. cannot be combined with Lebby et al. because each reference has different requirements for the structure of the bottom DBR mirror. The examiner believes that the references show all of the elements of the claims and can be combined. Although the mirrors cited in both references differ in composition slightly, the references may still be combined because they are analogous art. Brillouet and Lebby both deal with VCSELs and have primarily the same structure. The laser of both inventions are similar because the each have a top mirror, bottom mirror, and an active region between the mirrors. Lebby differed from the instant invention by not showing the tunnel junction layer. Brillouet was cited to cure the deficiency of Lebby because it disclosed the tunnel junction layer. The tunnel junction of Brillouet was combined with the VCSEL of Lebby to form the device of the instant invention. One of ordinary skill in the art would be motivated to use the tunnel junction of Brillouet because it is taught that the tunnel junction allows the pumping current to be conducted from the top mirror to the active region without a potential drop (col. 5, lines 6-13). Therefore Brillouet shows motivation for using the tunnel junction and thus can be combined with Lebby. The cited references show all of the elements of the claims and this action is made final.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MEW
May 25, 2003

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800